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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/607,764

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Eyal Ginsburg

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7590

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EXAMINER

TAN, VIBOL

ART UNIT

PAPER NUMBER

2819

DATE MAILED: 12/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/607,764

Applicant(s)

GINSBURG ET AL.

Examiner

Vibol Tan

Art Unit

2819

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

### A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 30 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-6,8-11,15,16,19 and 24-26 is/are rejected.
- 7) ☒ Claim(s) 3,7,12-14,17,18 and 20-23 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>6/30/03&amp;106/03</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 5, 8, 10 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamamoto Masato et al (JP-2000-134061).

In claim 1, Masato et al. teaches all claimed features in Fig. 1, an apparatus comprising: an electrode including a tapered end (4); and a piezoelectric material (2) of an acoustic resonator disposed over the electrode.

In claim 2, Masato et al. further teaches the apparatus of claim 1 wherein the piezoelectric material comprises Aluminum Nitride (AlN), Zin Oxide (ZnO), or lead titanate zirconate (PZT) (Abs.).

In claim 5, Masato et al. further teaches the apparatus of claim 1 further comprising a top electrode (3) adjacent to a second side (top side) of the piezoelectric material (2), wherein the electrode is a bottom electrode (4) to a first side (bottom side) of the piezoelectric material.

In claim 8, Masato et al. further teaches the apparatus of claim 1, wherein the tapered end is formed through a wt etching process (page 1 of 5 of the translation under MEANS, paragraph [006], line 22).

In claim 10, Masato et al. teaches all claimed features in Fig. 1, a film bulk acoustic resonator (FBAR), comprising: a bottom electrode (4) including a tapered end (as shown); a piezoelectric layer (2) layered on the bottom electrode (4); and a top electrode (3) positioned on top of the piezoelectric layer wherein at least a portion of the piezoelectric layer is disposed between the bottom electrode and the top electrode.

Method claim 15 corresponds to detailed circuitry already discussed similarly with regard to apparatus claim 1.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claim 19 is rejected under 35 U.S.C. 102(e) as being anticipated by Philliber et al. (U. S. PAT. 6,794,958).

In claim 19, Philliber et al. teaches all claimed features in Fig. 2B, an apparatus comprising: a piezoelectric layer (224) of an acoustic resonator; and means (col. 4, line 61) for preventing cracks in the piezoelectric layer.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 4, 6, 9, 11 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masato et al. in view of Philliber et al.

In claim 4, Masato et al. teaches all claimed features of the apparatus in claim 1; with the exception of teaching wherein the electrode comprises at least one of aluminum, gold, chromium, platinum, molybdenum. However, Philliber et al. teaches in col. 3, line 12, and the bottom electrode 222 is made of conducting material such as molybdenum.

Therefore; it would have been obvious to one ordinary skill in the art at the time of the invention was made to select the electrode made of molybdenum because molybdenum has a low thermoelastic loss, making it advantageous for use in resonators.

In claim 6, Philliber et al. further teaches the apparatus of claim 5 comprising a substrate layer (202) under the bottom electrode (222) in Fig. 2B.

In claim 9, Philliber et al. further teaches the apparatus of claim 1 wherein the acoustic resonator 220 is a film bulk acoustic resonator (FBAR) in col. 3, line 7.

In claim 11, Philliber et al. further teaches the apparatus of claim 10 comprising a substrate (202) positioned under the bottom electrode (222) in Fig. 2B.

In claim 16, Philliber et al. further teaches the method of claim 15 further comprising placing a photoresist layer on top of the metal layer (col. 1, line 16; the entire layer is covered using photoresist material).

Therefore; it would have been obvious to one ordinary skill in the art at the time of the invention was made to apply photoresist layer on top of the metal layer, as taught by Philliber, because such technique is a popular etching technique which includes a number of steps in the semiconductor manufacturing art.

7. Claims 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicants' admitted prior art of Fig. 1 in view of Masato et al.

In claim 24, the admitted prior art of Fig. 1 teaches a system comprising: a film bulk acoustic resonator (FBAR) filter, comprising: a piezoelectric material layered (16) on a bottom electrode (14); a transmitter (radio frequency ready to be transmitted by a transformer) electrically coupled to the FBAR filter (page 1, lines 15-22 of Background of the invention); with the exception of teaching a bottom electrode including a tapered end. However, Masato et al. teaches in Fig. 1, a bottom electrode (4) including a tapered end (as Fig. 1 shown).

Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention was made to combine both teachings to improve the difference between a resonance frequency and an antiresonance frequency.

In claim 25, Masato et al. further teaches the apparatus in claim 24 wherein the piezoelectric material comprises Aluminum Nitride (AlN), Zin Oxide (ZnO), or lead titanate zirconate (PZT) (Abs.).

In claim 26, the admitted prior art of Fig. 1 further teaches the system in claim 24 is a wireless system (page 1, line 9 of Background of the invention).

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8. Claims 3, 7, 12-14, 17, 18 and 20-23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vibol Tan whose telephone number is (571) 272-1811. The examiner can normally be reached on Monday-Friday (7:00 AM-4:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike J. Tokar can be reached on (571) 272-1812. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Vibol Tan

Primary Examiner, AU 2819



**VIBOL TAN**  
**PRIMARY EXAMINER**